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ABSTRACT

Nutrition curriculum design research was undertaken to address the issue of linkage between school food experiences and home food experiences of elementary school children in Hawaii. One hundred and forty-four parents judged the relative importance of seventeen food-related activites. The sample consisted of Asian, Caucasian, and Polynesian parents. Responses were calculated to perform the Smallest Space Analysis and the Individual Scaling Analysis. In general, parents judged the importance of the activities on the basis of child safety. A second multidimensional scaling was performed to measure the differences between identifiable groups of parents. The data generated by this research is significant for the development of child-centered nutrition curriculum, which in turn assures that a food curriculum can be developed that will give meaning to the food experiences that Hawiian children have in their own homes. (Authors/LH)

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How Parents View the Importance of 17 Food Activities Performed by Children: Multidimensional Scaling Analyses of Paired Comparison Judgments, A. Maretzki, S. Shimabukuro, Dept. of Food and Nutritional Sciences, University of Hawaii, Honolulu, Hawaii.

Health, including diet selection for good nutrition, has traditionally been taught in U.S. schools, but nutrition education as an identifiable content area with its own curriculum has evolved mainly since the 1969 White House Conference on Food, Nutrition and Health. One of the recommendations arising out of that conference was "that a comprehensive and sequential program of nutrition education be included as an integral part of the curriculum of every school in the United States and its territories."[1] This recommendation, which culminated in the passage of landmark nutrition education entitlement legislation in 1977, has already generated collaboration between nutritionists and educational specialists who are in the business of developing curricula.

Curriculum design is a highly specialized field in which there is perhaps more activity than the developmental level of instructional or curriculum theory warrants. The paucity of comprehensive theories of instruction is easily explained. Not so easily understood, however, is why both nutrition specialists and educational specialists concerned with nutrition curriculum design have seemingly overlooked the curricular relevance of the child's "acquisition of knowledge about food", the aspect of the child's food education which is centered in the home and reflects the values of the culture in which a child is being reared.

As early as 1966, Jerome Bruner, a contemporary educational philosopher and theoriest noted that "a theory of instruction seeks to take account of the fact that a curriculum reflects not only the nature of knowledge itself but also the nature of the knower and of the knowledge-getting process."[2]

In 1975, Griffin and Light[3] noted that any one of several curriculum models might be considered the most appropriate design for a nutrition curriculum depending upon the prevalent view of education in the community. However, in 1976, when the Society for Nutrition Education conducted an analysis of 22 of the K-12 nutrition curriculum guides commonly used in the U.S.,[4] there was little evidence to suggest that the developers of

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[1]White House Conference on Food, Nutrition and Health, Final Report, U.S. Government Printing Office, 1970, p. 150.

[2]Jerome S. Bruner, Toward A theory of Instruction, Cambridge: Harvard University Press, Belknap Press, 1966, p. 72.

[3]Gary A. Griffin and Luise Light, Nutrition Education Curricula: Relevance, design and the problem of change, Paris: UNESCO Educational Studies and Documents, (New Series #18), 1975.

[4]Katherine A. Cooper and Christine E. Go, "Analysis of Nutrition Curriculum Guides at the K-12 Level", Journal of Nutrition Education, 8:2 (April-June 1976) pp. 62-66.

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nutrition curricula were attempting to go beyond the integration of well-established principles of nutritional science with well-established principles of learning in producing nutrition curriculum designs. The result, as anyone who has reviewed nutrition curriculum guides can testify, is that at present most U.S. nutrition curricula look very much alike.

In the early 1970's the author served for several years as a nutrition education consultant to several low income primary schools in Hawaii. During this time, spent in almost daily contact with teachers, educational assistants, children, parents and administrators, it became increasingly apparent that, at least for that island state with its mixture of Caucasian, Asian and Polynesian families, a nutrition curriculum design was needed which rationally addressed the issue of developing linkages between the school and the extra-curricular food experiences of children. This need was seen to be greatest for children from homes in which the foodways reflected a culture different from that of the classroom teacher, but it was observed that, in general, the way in which the children learned about food at school tended to disintegrate rather than to systematically organize the knowledge of food with which the child entered school as a kindergartener.

In a book entitled Child-Centered Education, Entwistle describes the "not-subject":

> "We teach children "not-subjects", where "not-subjects" implies the organization of subject matter on principles other than the traditional (or, indeed, any) subject divisions. What is really being claimed is something like, "We teach children, not subjects, but human knowledge organized in ways more easily apprehended by the immature or more in accordance with the way in which they use knowledge in their everyday lives. What we want to avoid is knowledge in watertight compartments."
>
> "Thus, we are not really involved in a discussion of the child as against subject matter. The problem is rather that of discovering alternative ways of bringing knowledge to the child, given what we know about his development and the reasons why he needs to be educated."[1]

It was when we began to think about nutrition as a "not-subject and how to teach it, as such, to children that we began to sense the need as curriculum designers to know a great deal more than we did about the way in which parents view the food activities in which their young children engage. Because it is parents who during the impressionable preschool years give meaning to their children's food experiences, it became our

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[1]Harold Entwistle, Child-Centered Education, London: Methuen and Co., 1970, pp. 98-99.

intent to deliberately reflect parental attitudes and values, wherever possible, in the design of what we have come to call the "Hawaii Food Curriculum." This name for the curriculum was selected deliberately because it suggested a body of knowledge which belonged in some sense to everybody. This was in direct contrast with nutrition, which in an institutional sense, belonged to health education. Food was seen as an ideal "not-subject" to be organized into a comprehensive, child-centered nutrition curriculum. Before launching the curriculum design phase of the Food Education project, we undertook a study of the way in which 144 parents judged the importance of certain food activities for their children. We also investigated the way classroom teachers, nutritionists and children themselves perceived these activities. In the parent study we specifically attempted to determine:

1. Is there a pattern to the way parents in general, and specific groups of parents in particular, view the importance of those activities which might be incorporated into an elementary level course of study relating to food?

2. If a pattern is noted in the way parents judge importance, could such a pattern be reflected in the design of a food curriculum to bring nutritionally relevant food knowledge to children in Hawaii, given what we know about their development and the reasons why they need to be educated about food?

Seventeen food activities were selected for judging. They are described in Table 1. These activities, in addition to having previously been used in a nutrition education program, are activities in which children at the primary grade level in Hawaii do engage outside the classroom. The proportion of children reported by parents to be performing each of these activities ranged from 99% in the case of making a peanut butter sandwich to 10% in the case of making a simple main dish for dinner.

The parent sample was drawn from three elementary schools in the Honolulu district on the island of Oahu. The three schools included 1) a school adjacent to a low income housing development which enrolled many immigrant children from Samoa and the Philippines, 2) a Follow Through school, which also drew children from a public housing development, but where federal funds were being provided to implement the curriculum model of the Bank Street College of Education which involves the use of classroom cooking centers, and 3) a school in a suburban residential section of the city. A total of 144 parents judged the importance of the activities, 48 parents from each school. Half of the parents from each school had a child in the first grade and the remainder were parents of third graders. At each grade level the sample was additionally divided between parents of boys and of girls.

Parents judged the activities by viewing photographs showing a child of the same age and sex as their own child actually performing the activities in a realistic home setting. Each of the activities was

Table 1

Description of the Food-Related Activity Photographs Judged by Parents

Label Affixed to Activity Photographs	Food Group/s Shown	How Child is Depicted	Type of Activity Illustrated
Fixing breakfast	Milk and Cereal	Alone	Food Preparation
Helping in the garden	Vegetables	With parent	Food production
Going to the market with mother	Vegetables	With parent	Food purchasing
Helping to bake -- cracking an egg	Cereal and Meat	With parent	Food preparation
Making tuna fish spread for a sandwich	Meat and Cereal	Alone	Food preparation
Going to the market for mother to buy groceries	Cereal and Milk	Alone	Food purchasing
Preparing a peanut butter and jelly sandwich	Cereal and Meat	Alone	Food preparation
Setting the table	None	Alone	Food service
Measuring, washing, and cooking rice	Cereal	Alone	Food preparation
Going crabbing and fishing	Meat	With parent	Food procurement
Spending money alone	Candy, Gum	With peer	Food purchasing
Washing dishes	None	Alone	Food service
Washing and peeling vegetables	Vegetables	Alone	Food preparation
Cutting vegetables	Vegetables	With parent	Food preparation
Helping to stir food in a pot	Unidentified	With parent	Food preparation
Preparing a simple main dish like baked chicken for the family dinner	Meat	Alone	Food preparation
Frying egg and luncheon meat	Meat	Alone	Food preparation

paired with each of the other activities to produce a series of 136 pairs of the 17 photographs. Each respondent judged the entire series. In judging the activities the parent was shown the pairs of photographs in random order and for each pair was asked to select the picture depicting the activity which was the more important one for his or her child to be able to do. An interviewer recorded the parent's selection and also noted the reasons given for the choices which were made.

A total of 19,584 parent responses were converted to 144 matrices and distance coefficients were calculated.[1] These same distances were used to perform both Smallest Space Analysis[2] (SSAI) and Individual Scaling Analysis[3] (INDSCAL).

In scaling the activities, Guttman and Lingoes Smallest Space Analysis (SSAI) was found to produce an interpretable pattern in two dimensions.[4] This SSA map is shown in Figure 1. The numerals on the map correspond to the judged order of importance of the 17 activities; 1

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[1]The formula used for calculating distances is simply: $d_{ij} = \sqrt{E\ (X_{ia} - X_{ja})^2}$

Where, in the case of this research,

d_{ij} = The dissimilarity between food preparation item (i) and (j), as expressed by the sample (all respondents), or some subsample (e.g. parents of third graders) under consideration.

X_{ia} = The number of times parent (a) chose picture (i) in 17 possible choices.

X_{ja} = The number of times parent (a) chose picture (j) in 17 possible choices.

The differences are squared in order to account for negative differences. The squared differences are summed across all parents (a), where a=1,2,... 144.
Then the square root of the summed squared distances is taken in order to scale the measure back to the original metric.

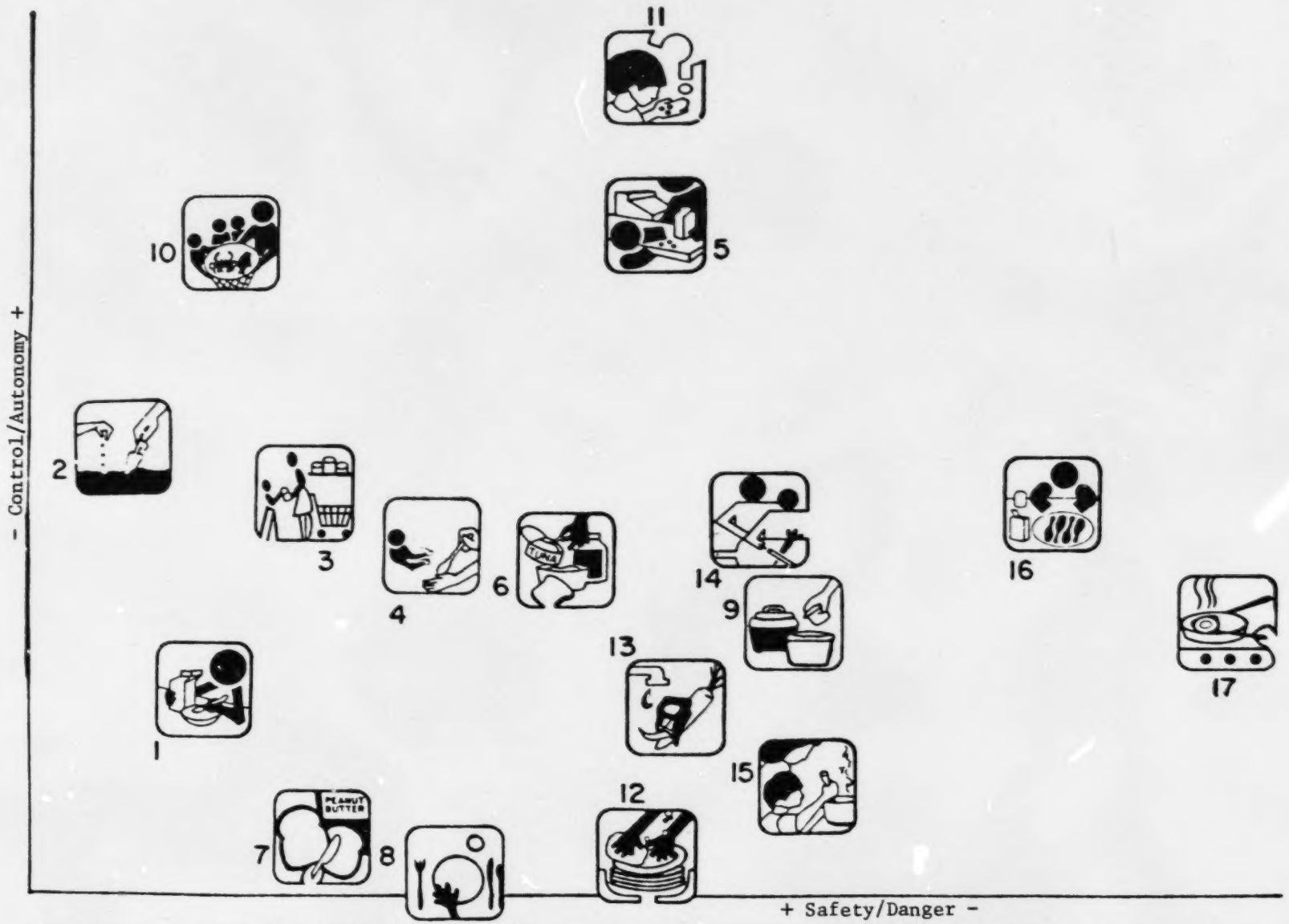
It was decided that distances, rather than similarities, would be the most appropriate coefficient for this particular research because the major interest was in the relationship between items according to their importance. Since respondents were actually rating items in terms of importance, the complete information we were looking for--and no more--was in the raw ratings. Since the value of the relative importance is reflected largely in the mean it was considered appropriate to use a measure of distance which did not eliminate it.

[2]James C. Lingoes, A General Survey of the Guttman-Lingoes Nonmetric Program Series, Ann Arbor, Michigan: MATHESIS Press, 1976.

[3]J. Douglas Carroll and Jih-Jie Chang, "A New Method for Dealing with Individual Differences in Multidimensional Scaling", Psychometrika, 35:283-319 (1970).

[4]Guttman-Lingoes Coefficient of Alienation 0.16361.

Figure 1



Parent perceptions of the importance of food activities for young children (from SSAI Analysis).

being the most and 17 the least important. Comments made by the parents in judging the activities indicated that the most salient attribute of the activities (graphed on the horizontal axis) was that of safety. In general the most important activities are the safest and the least important activities the most dangerous. For most parents, danger was associated with the use of a knife, the range and to a lesser extent with other appliances. This horizontal dimension was confirmed to be safety/danger by having a group of independent judges rank the activities from safest to most dangerous and submitting these rankings to a non-metric version of J.D. Carroll's PROFIT program developed at the University of Hawaii by Gow for specific application to SSAI.

The vertical axis on Figure 1 corresponds to the second most salient attribute of the quality of importance. As indicated by the comments of the judges and confirmed by PROFIT, this dimension can be labeled autonomy/control. The more autonomous activities are those at the top of the scale while the least autonomous activities are those at the bottom.

It will be noted from Figure 2 that the food preparation activities range from safe to dangerous and are intermediate in autonomy. Two of these activities, preparing simple breakfast and making a peanut butter sandwich, were responded to by parents as food consumption activities and have been so designated on Figure 2. The food purchasing, production and procurement activities are more autonomous and the food service activities less autonomous than are those activities which involve food preparation and consumption. On the SSA map, each of the types of activities was found to occupy a contiguous area. The relative location of these areas, the comments of parents and the confirmatory PROFIT analysis all indicate that the pattern of activities observed resembles the model for maternal and for child behavior conceptualized by Schaefer.[1]

Based on the way in which parents approached the judging task it was possible to separate the 17 activities into groups as shown in Figure 3. In the lower half of the diagonal dividing the SSA space are two clusters of activities. One group which were anxiety-producing for the parent and another group which were low in autonomy and generally considered to have little educational value for children of this age. The nine activities in this control/danger region have a mean importance rank of 12.3. The more important and more educationally significant activities, are found in the upper half of the SSA map. These eight activities have a mean importance of 5.3. It is from this safety/autonomy region that we have selected the four basic themes to be developed in the K-3 food curriculum.

A second multidimensional scaling analysis was then performed to measure the difference between identifiable groups of parents for whose children the Hawaii Food Curriculum is being designed. In addition to the three primary classifications by grade, sex, and school attended by

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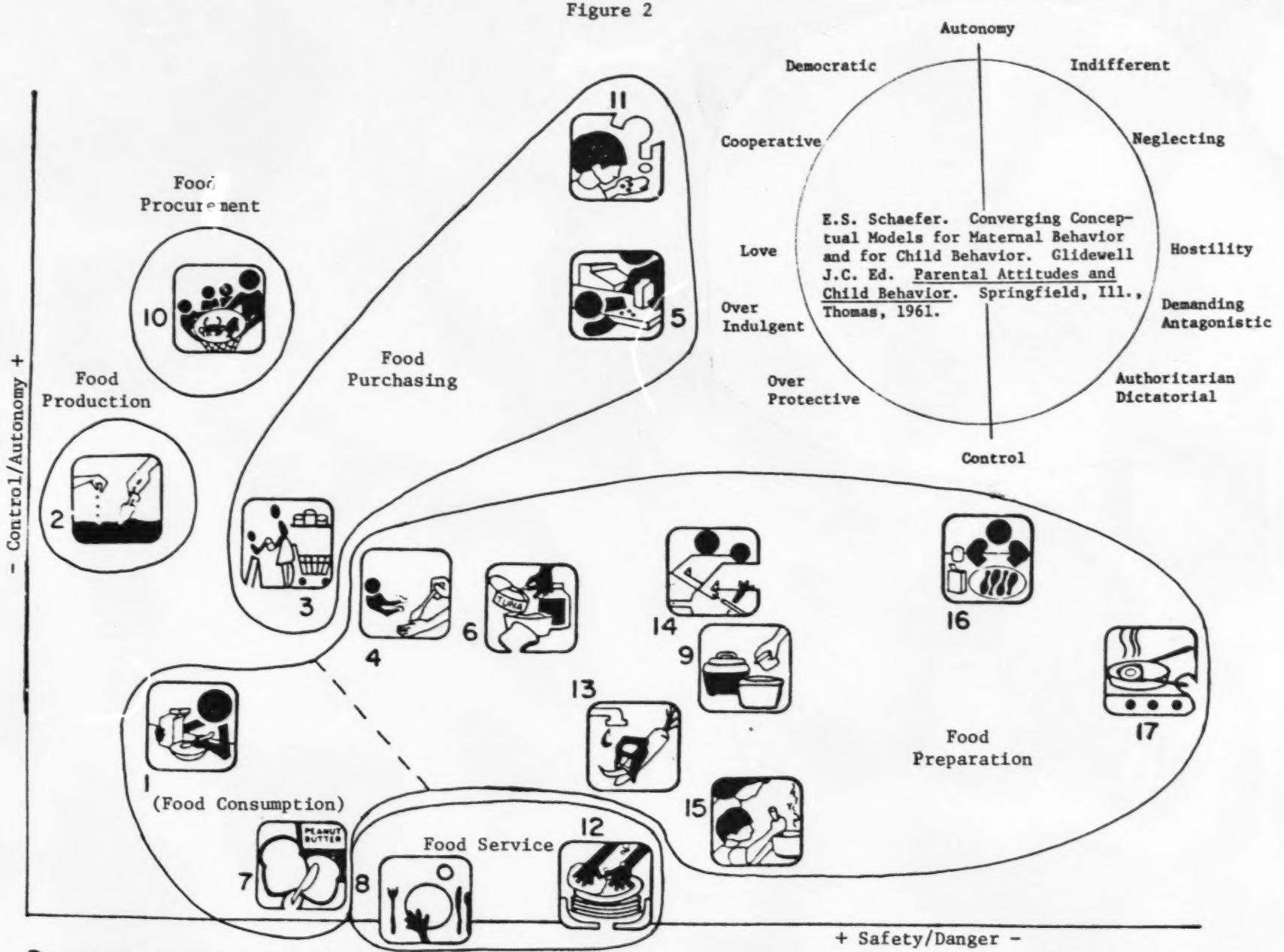
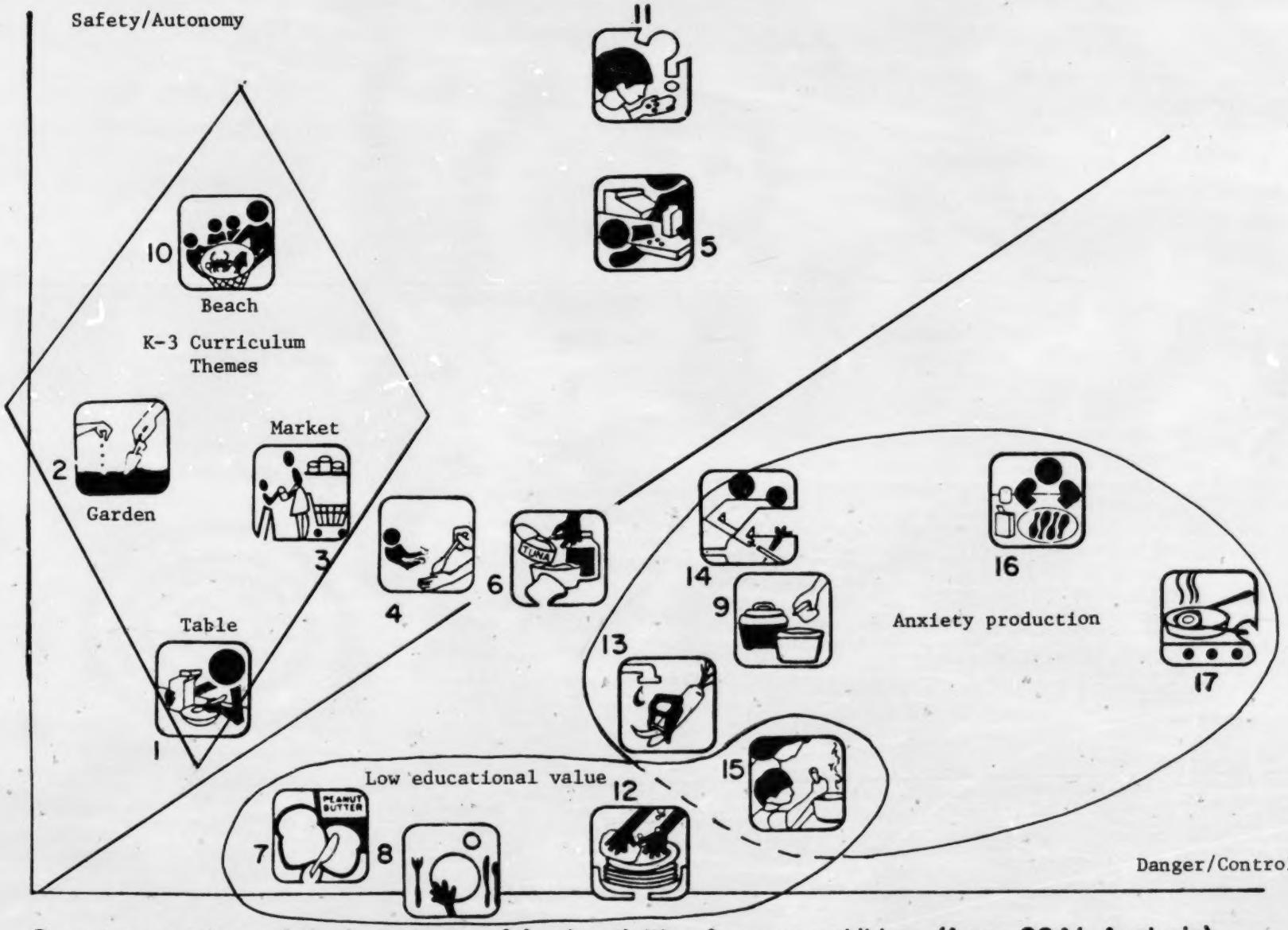
[1]E.S. Schaefer, Converging Conceptual Models for Maternal Behavior and for Child Behavior. J.C. Glidewell, ed., Parental Attitudes and Child Behavior, Springfield, Ill.: Thomas, 1961

Figure 2



Parent perceptions of the importance of food activities for young children (from SSAI Analysis).

Figure 3



Parent perceptions of the importance of food activities for young children (from SSAI Analysis).

the child, the parent sample was also classified on the basis of receipt of a free lunch by the child (this provided a crude measure of family income), the employment status of the mother (Hawaii reportedly has the highest proportion of working mothers in the U.S.), and the ethnicity of the child (there were large enough numbers of Caucasian, Japanese, Filipino, part-Hawaiian and Samoan parents to justify creating subgroups for these ethnicities).

The analysis performed to scale the parent groups was Carroll and Chang's Individual Scaling Analysis (INDSCAL) constrained to two dimensions. Six separate INDSCAL analyses were performed and have been combined in Figure 4. This graph enables one to determine that Caucasian and Hawaiian parents and the parents of third graders gave approximately equal weight to safety and autonomy in making their judgments of importance while Samoan parents at the low income school placed relatively more emphasis on the safety/danger dimension. The other 13 groups, though in varying degrees, all considered autonomy more salient than safety in judging the relative importance of activities for their children.

The ranks assigned to each activity by each of the 16 parent groups are shown in Table 2. Table 3 shows the activities which were rated differently in overall importance when ethnic groups were compared. These comparisons are interesting because they show that in each case the more numerically predominant ethnic group, shown on the left, tends to rate higher in importance those activities which are more autonomous. A specific example is provided by the comparison of Caucasian and Filipino parents. Using as a criteria of "different in importance" a rank difference greater than three, it was noted that shopping for mother, spending money alone, crabbing and fishing, making tuna spread and making a simple main dish were activities judged more important by Caucasian parents while shopping with mother, setting the table, preparing rice, washing dishes and stirring food in a pot were judged higher in importance by Filipino parents. This pattern of preference for higher autonomy activities also distinguishes parents of boys when compared with parents of girls, parents of non-recipients compared with parents of recipients of the free school lunch and working mothers when compared with mothers who were not employed. It is this difference in perception of the importance of these activities which is captured in the INDSCAL coordinates for the parent groups shown in Figure 4.

Having found in multidimensional scaling analysis, a research tool with which it is possible to mathematically describe the way parents make judgments about the importance of food activities for their young children, it is our belief that a child-centered nutrition curriculum can be designed rationally and, as a design, modified systematically within a school or classroom setting to meet the educational needs of children from many different kinds of families in Hawaii. In this way a food curriculum for Hawaii can be developed which will give meaning to the many food experiences which our children have in their island homes.

Table 2

Importance Ranking of 17 Food-Related Activities by a Group of 144 Parents and by 16 Subgroups of Parents Within the Total Sample

		Rank Order of Importance														
		Sex of Child		Grade of Child		Mother's Employment Status		Child's Receipt of Free School Lunch		School Attended by Child			Child's Ethnicity				
Total Group N=144	Activity	Male	Female	1st Grade	3rd Grade	Working Mother	Non-working Mother	Free Lunch Recipient	Free Lunch Non-recipient	High Income School	Low Income School	Middle Income School	Caucasian	Japanese	Hawaiian	Filipino	Samoan
		N=72	N=72	N=72	N=72	N=70	N=74	N=53	N=91	N=48	N=48	N=48	N=30	N=19	N=41	N=24	N=13
1	Fixing a simple breakfast	1	1	1	2	1	1	2	1	1	1	5	1	3	3	1	3
2	Helping in the garden	2	7	2	5	2	4	8	2	3	8	3	3	1	7	3	7
3	Shopping with mother	4	2	3	3	4	2	1	8	9	2	1	8	7	2	2	1
4	Helping mother bake	7	3	4	4	3	3	3	4	6	4	4	6	4	4	4	2
5	Going shopping for mother	5	4	10	1	5	5	4	5	4	13	2	5	6	1	13	10
6	Making tuna spread	6	5	7	7	6	6	6	3	5	9	6	4	5	6	8	4
7	Making peanut butter sandwich	8	8	5	12	7	8	7	9	8	3	13	7	12	10	5	9
8	Setting the table	9	9	6	16	11	7	11	10	11	5	9	12	11	11	6	6
9	Preparing rice	12	6	13	6	10	9	5	11	12	6	8	15	8	5	7	14
10	Going crabbing and fishing	3	16	8	13	8	13	16	7	7	14	10	9	2	16	14	13
11	Spending money alone	10	12	9	8	9	14	17	6	2	17	7	2	10	9	17	17
12	Washing dishes	11	11	11	9	12	10	9	13	13	7	12	14	9	8	10	11
13	Washing and peeling vegetables	13	10	12	10	13	11	13	12	10	10	14	10	13	12	12	12
14	Cutting vegetables	14	13	14	11	14	12	12	14	14	12	11	13	14	14	11	5
15	Stirring food in a pot	15	14	15	15	15	15	10	15	16	11	15	16	15	13	9	8
16	Making simple main dish for dinner	16	15	16	14	16	16	14	16	15	15	16	11	16	15	15	15
17	Frying egg and luncheon meat	17	17	17	17	17	17	15	17	17	16	17	17	17	17	16	16

Table 3

Activities Ranked More Important by Parents of One Ethnic Group Than by Parents of Another Ethnicity

More* Important Activities	Ethnicity	More Important Activities
Spending money alone Helping mother bake Making peanut butter sandwich	Caucasian vs Japanese	Preparing rice Crabbing and fishing Washing dishes
Spending money alone Crabbing and fishing Helping in the garden Making simple dinner dish	Caucasian vs Part-Hawaiian	Preparing rice Washing dishes Shopping with mother Shopping for mother
Shopping for mother Making tuna spread Crabbing and fishing Spending money alone Making simple dinner dish	Caucasian vs Filipino	Shopping with mother Setting the table Preparing rice Washing dishes Stirring food in a pot
Helping in the garden Shopping for mother Crabbing and fishing Spending money alone Making simple dinner dish	Caucasian vs Samoan	Shopping with mother Helping mother bake Setting the table Cutting vegetables Stirring food in a pot
Helping in the garden Crabbing and fishing	Japanese vs Part-Hawaiian	Shopping with mother Shopping for mother
Shopping for mother Crabbing and fishing Spending money alone	Japanese vs Filipino	Shopping with mother Making peanut butter sandwich Setting the table Stirring food in a pot
Helping in the garden Shopping for mother Preparing rice Crabbing and fishing Spending money alone	Japanese vs Samoan	Shopping with mother Setting the table Cutting vegetables Stirring food in a pot
Shopping for mother Spending money alone	Part-Hawaiian vs Filipino	Helping in the garden Making peanut butter sandwich Setting the table Stirring food in a pot
Shopping for mother Preparing rice Spending money alone	Part-Hawaiian vs Samoan	Setting the table Cutting vegetables Stirring food in a pot
Helping in the garden Making peanut butter sandwich Preparing rice	Filipino vs Samoan	Making tuna spread Cutting vegetables

*Rank difference >3 between groups

Ethnic Groups

F	Filipino	(24)*
H	Hawaiian	(41)
C	Caucasian	(30)
S	Samoan	(13)
J	Japanese	(19)

Sex

♂	Males	(72)
♀	Females	(72)

Grade

1	First Graders	(72)
		(72)
3	Third Graders	(72)

School

I	Low Income	(48)
II	High Income	(48)
III	Middle Income	(48)

Employment

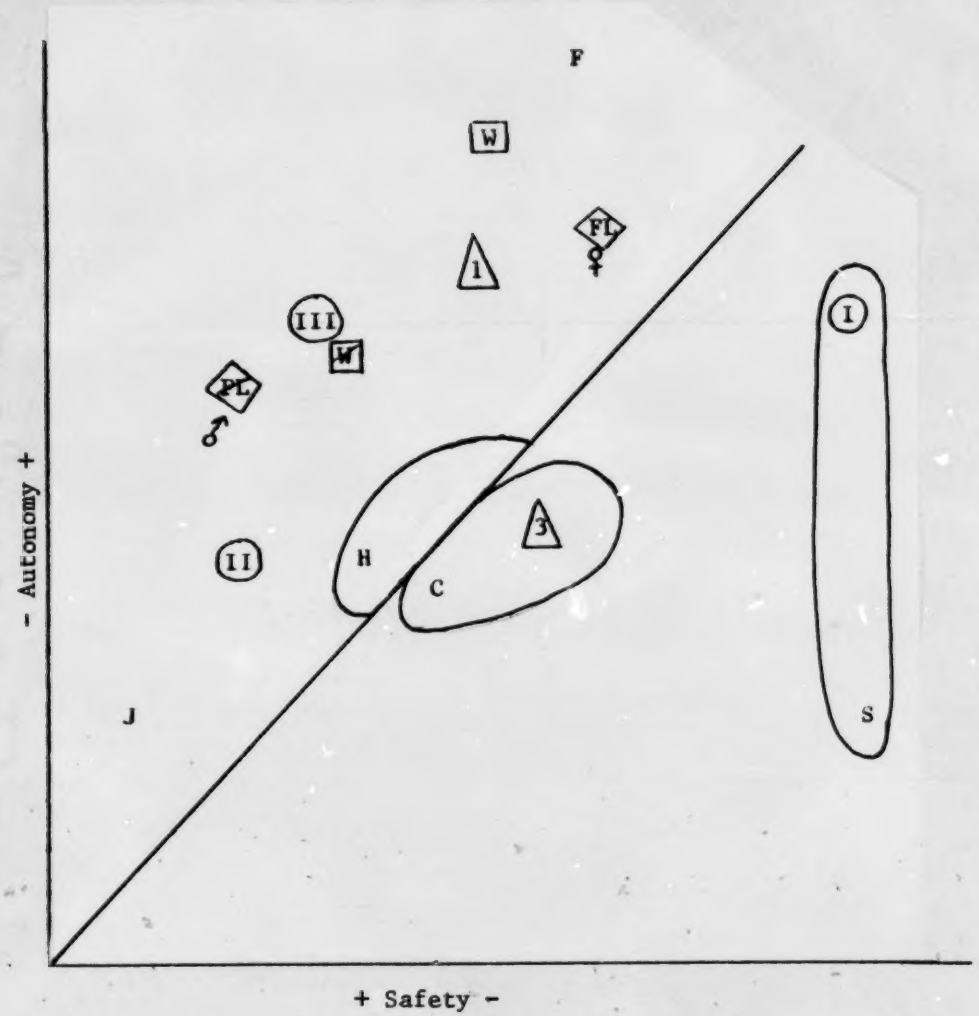
W	Working Mothers	(70)
W	Non-working Mothers	(74)

School Lunch

FL	Recipients of Free School Lunch	(53)
FL	Non-recipients of Free School Lunch	(91)

*Indicates number of parents in the subgroup

Figure 4



Differences between parent groups in their judgment of the importance of selected food activities for their children (2 dimensional INDSCAL Analysis)